Joint Department of

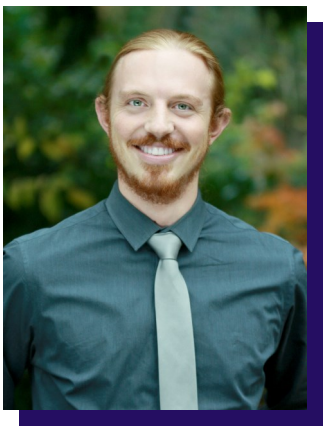
BIOMEDICAL ENGINEERING

UNC CHAPEL HILL | NC STATE UNIVERSITY

Coulter Seminar Series Presents

"User-Programmable Hydrogel Biomaterials to Probe and Direct 4D Stem Cell Fate"

Cole A. DeForest, PhD
Weyerhaeuser Endowed Associate Professor
Department of Chemical Engineering
University of Washington



Dr. Cole A. DeForest is the Weyerhaeuser Endowed Associate Professor in the Departments of Chemical Engineering and Bioengineering, as well as a core faculty member of the Institute for Stem Cell & Regenerative Medicine at the University of Washington (UW) where he began in 2014. He received his B.S.E. degree from Princeton University in 2006, majoring in Chemical Engineering and minoring in Material Science Engineering and Bioengineering. He earned his Ph.D. degree under the guidance of Dr. Kristi Anseth from the University of Colorado in Chemical and Biological Engineering with an additional certificate in Molecular Biophysics. His postdoctoral research was performed with Dr. David Tirrell in the Divisions of Chemistry and Chemical Engineering at the California Institute of Technology. He has published ~55 peer-reviewed articles, including as the corresponding author for those appearing in Nature Materials, Nature Chemistry, Advanced Materials, JACS, PNAS, Science Advances, and Nature Reviews Materials. Dr. DeForest has received numerous research awards and honors including the Society for Biomaterials Young Investigator Award (2020), NIH Maximizing Investigators' Research Award (MIRA R35, 2020), Safeway Early Career Award (2018), NSF CAREER Award (2017), AIChE 35-Under-35 Award (2017), ACS PMSE Young Investigator Award (2017), Jaconette L. Tietze Young Scientist Award (2015), Biomedical Engineering Society Student Fellow Award (2013), DSM Polymer Technology Award (2011), ACS Excellence in Graduate Polymer Research Award (2010), MRS Graduate Student Research Gold Award (2009), Society for Biomaterials Outstanding Achievement Award (2009), Princeton University Material Science Student of the Year (2006), Princeton University Most Approachable Resident Adviser (2005), and Boulder High School Valedictorian (2002). Notably, he has also been recognized for excellence in teaching and was awarded the UW Presidential Distinguished Teaching Award (2016), given annually to a single Assistant Professor across all of the UW. His research has been supported through fellowships and grants from the National Science Foundation, the National Institutes of Health, and the US Department of Education.

ABSTRACT

The extracellular matrix directs stem cell function through a complex choreography of biomacromolecular interactions in a tissue-dependent manner. Far from static, this hierarchical milieu of biochemical and biophysical cues presented within the native cellular niche is both spatially complex and ever changing. As these pericellular reconfigurations are vital for tissue morphogenesis, disease regulation, and healing, in vitro culture platforms that recapitulate such dynamic environmental phenomena would be invaluable for fundamental studies in stem cell biology, as well as in the eventual engineering of functional human tissue. In this talk, I will discuss some of our group's recent successes in reversibly modifying both the chemical and physical aspects of synthetic cell culture platforms with user-defined spatiotemporal control, regulating cell-biomaterial interactions through user-programmable Boolean logic, and engineering microvascular networks that span nearly all size scales of native human vasculature (including capillaries). Results will highlight our ability to modulate intricate cellular behavior including stem cell differentiation, protein secretion, and cell-cell interactions in 4D.

Friday, February 5th
12:00 Noon

Seminar will be presented virtually via Zoom:
https://go.unc.edu/j5W3E